Life Cycle Cost Analysis

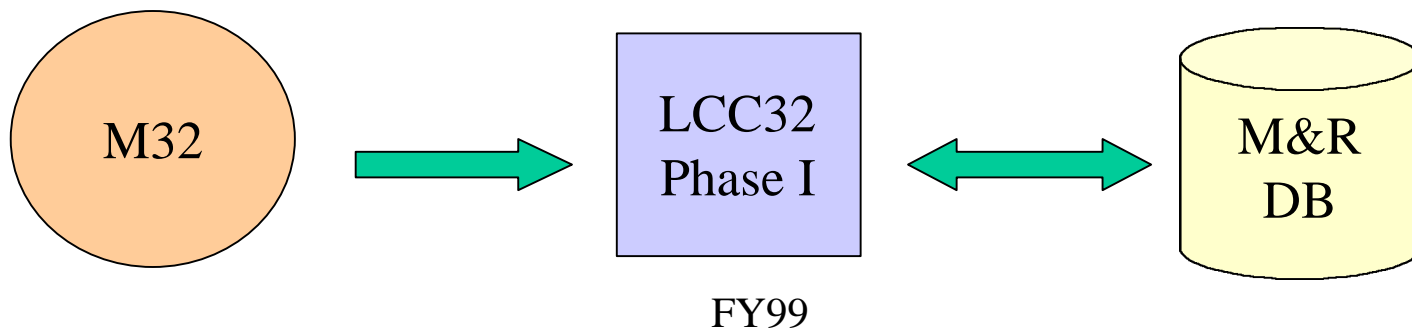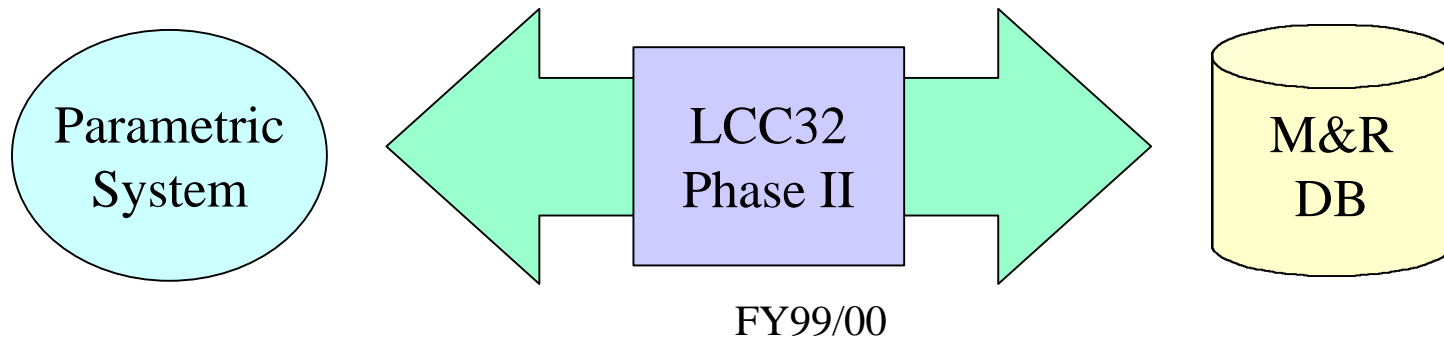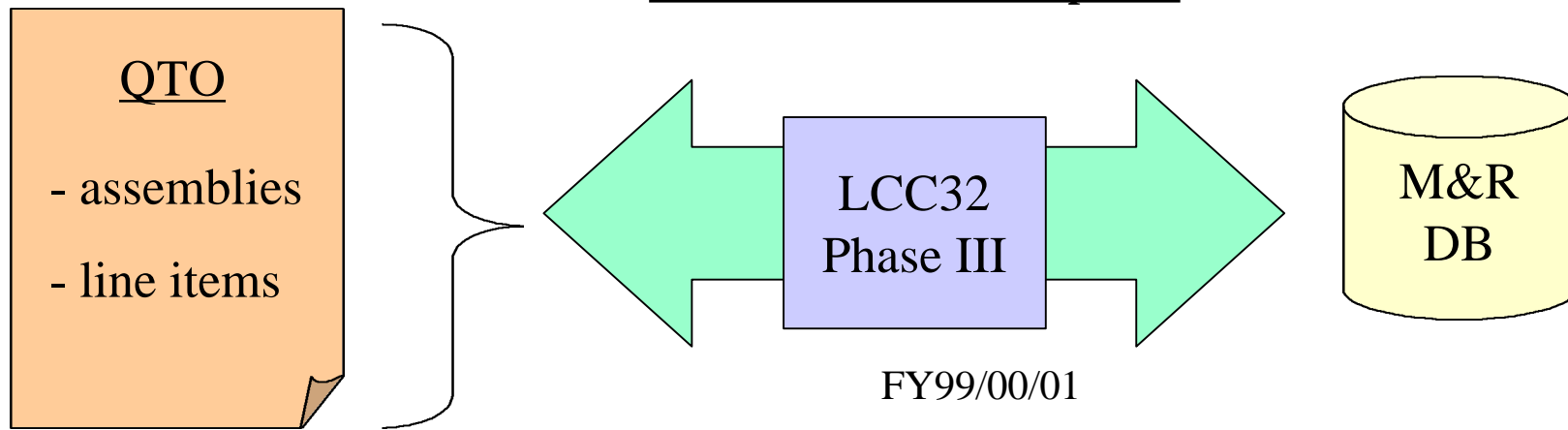## Development Outline for the Cost Engineering Tri-Services Committee

U.S. Army Corps of Engineers, CEMP-EE

30 Oct 98

Background

• Life cycle cost analysis has been performed traditionally on specific design features, i.e., HVAC systems, roofing material, exterior features, etc.

• Current thinking looks at design implications as they pertain to the *entire facility*, not just for a particular design feature

• This plan provides a unified approach for DoD to incorporate total facility life cycle cost analysis into the Tri-Service Automated Cost Engineering System

LCC32 - Phased Development

QTO

- assemblies

- line items

LCC32 Phase III

M&R DB

FY99/00/01

Parametric System

LCC32 Phase II

M&R DB

FY99/00

M32

LCC32 Phase I

M&R DB

FY99

Phase I: LCC32 Stand-Alone
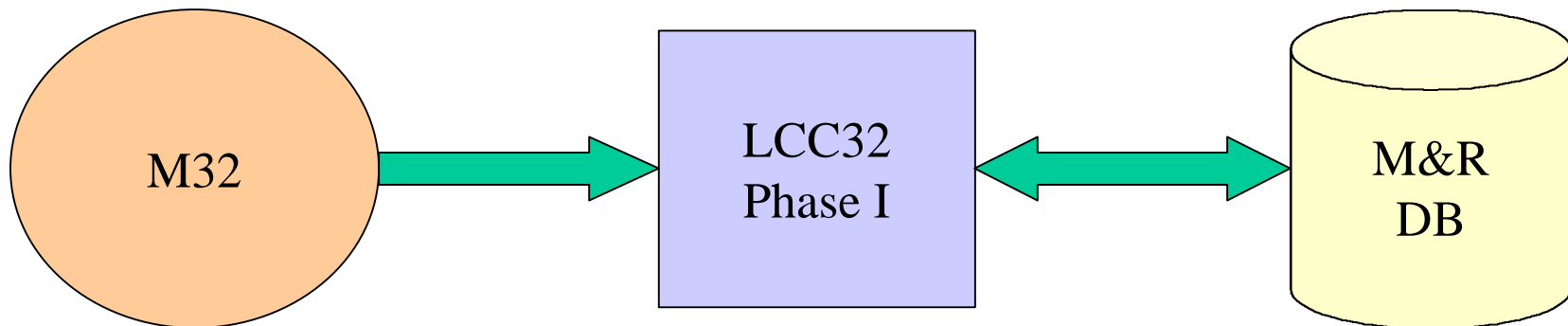
- Finish previously-developed LCC32 prototype

- Application structured to analyze life cycle cost implications of "design features," (not total life cycle costs of entire facility) e.g. , HVAC systems, windows, siding, roofing, etc.

- "Look-up" feature to the M&R DB; can import M&R data by manually selecting items, and edit data residing in database

- Imports capital cost(s) of a design feature from a M32 project file

Phase I: LCC32

LCC For Windows - [LCC Study C:\Program Files\LCC 32 Prototype\Study\CLASS2.lcs]

File   Edit   View   Alternatives   Window   Help

Study Summary | Alternative 1 | Alternative 2 | Alternative 3

- Low-Profile Tower, 30HP Motor
  - Construction/Acquisition
  - Routine M&R
    - Tower
    - Motor
  - Major R&R
    - Tower
      - Major Repair to Tower
      - Replacement of Tower
    - Replacement of Motor

		Lvl	Name	Cost Type	Escal.	Qua	UOM	Unit Cost	Total Cost	First Occur.	Freq Yrs
▶	📁	0	Low-Profile Tower, 30HP								
	📄	1	Construction/Acquisition	Construction/Acquisition	None	1.0	EA	9800.0	9800.0	Jan 1998	0
	📁	1	Routine M&R								
	📄	2	Tower	Routine M&R	None	1.0	EA	600.0	600.0	Jan 1999	1
	📄	2	Motor	Routine M&R	None	1.0	EA	100.0	100.0	Jan 1999	1
	📁	1	Major R&R								
	📁	2	Tower								
	📄	3	Major Repair to Tower	Major Repair	None	1.0	EA	250.0	250.0	Jul 2013	15

3:08 PM   10/1/98

Phase I: LCC32 Stand-Alone

Pros:

- Generates studies in compliance with Fed and DoD guidance
- Can view and edit the updated M&R DB (from R.S. Means)
- 32-bit, Windows environment (95/98/NT)
- Imports cost data from M32 files

Cons:

- Reporting capability limited - no graphs
- Lack of automatically generating life-cycle costs of an entire facility
- Lack of "assemblies level" automated link to M&R DB (M&R data is stored at the assemblies level)

Phase I: LCC32 Stand-Alone

Schedule/Tasks:

- Negotiate Corps license with R.S. Means for M&R DB
    - → FY99 funds, est. $35-60k
    - → will include some data analysis and conversion
    - → FY99 funding approved - negotiations underway

- Finish current version of LCC32
    - → already paid for with FY98 funds
    - → links to updated M&R and M32 included
    - → some work is currently being done by BSD, but the bulk of it will resume upon completion of M32 (est. Jan. 99)
    - → est. completion date: Spring 99

- Provide training workshop
    - → have BSD provide workshop for users
    - → pending FY99 funds, est. $10-15k
    - → available by April 99

Phase II: Parametric Level Link
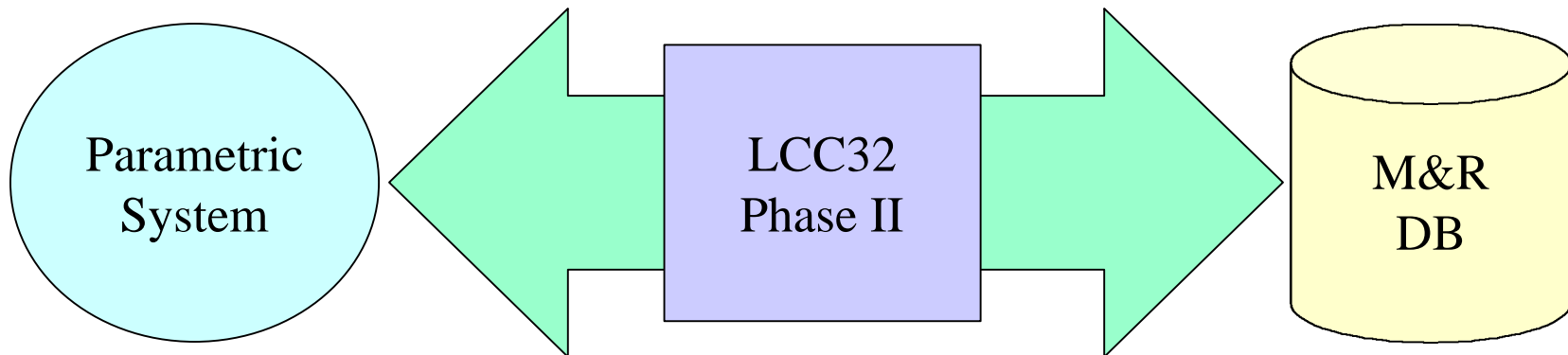
- Develop "assemblies level" linkage to M&R DB

- Application structured to analyze life cycle costs of <u>entire facility</u> (not just life cycle costs of "design features")

- Assemblies from parametric estimate will be linked to M&R assemblies data from the DB

- Major overhaul to the LCC32 application - must be re-designed to accommodate these links

Phase II: Parametric Level Link

Building Design 1					
Descrip / Source Tag	Year 1	Year 2	Year 3	Year 4	Year 5
Assembly 1 (0911081SL)	$15	$0	$0	$0	$0
Routine M&R	$0	$0	$1	$1	$0
Major Repair	$0	$0	$0	$0	$7
Replacement	$0	$0	$0	$0	$0
Assembly 2 (0821001UQ)	$14	$0	$0	$0	$0
Routine M&R	$0	$1	$2	$3	$3
Major Repair	$0	$0	$0	$0	$0
Replacement	$0	$0	$0	$0	$0
Assembly 3 (0311001BT)	$15	$0	$0	$0	$0
Routine M&R	$0	$2	$2	$2	$0
Major Repair	$0	$0	$0	$0	$0
Replacement	$0	$0	$0	$0	$15
Annual Totals	$44	$3	$5	$6	$25
Life Cycle Total					**$83**

Phase II: Parametric Level Link

Pros:

- Generates studies in compliance with Fed and DoD guidance
- Automated assemblies level link to M&R DB
- Analyzes life cycle costs for entire building designs; able to provide analysis at the programming / budgeting phases
- Imports data at the assemblies level from parametric system
- Universal application; truly unique
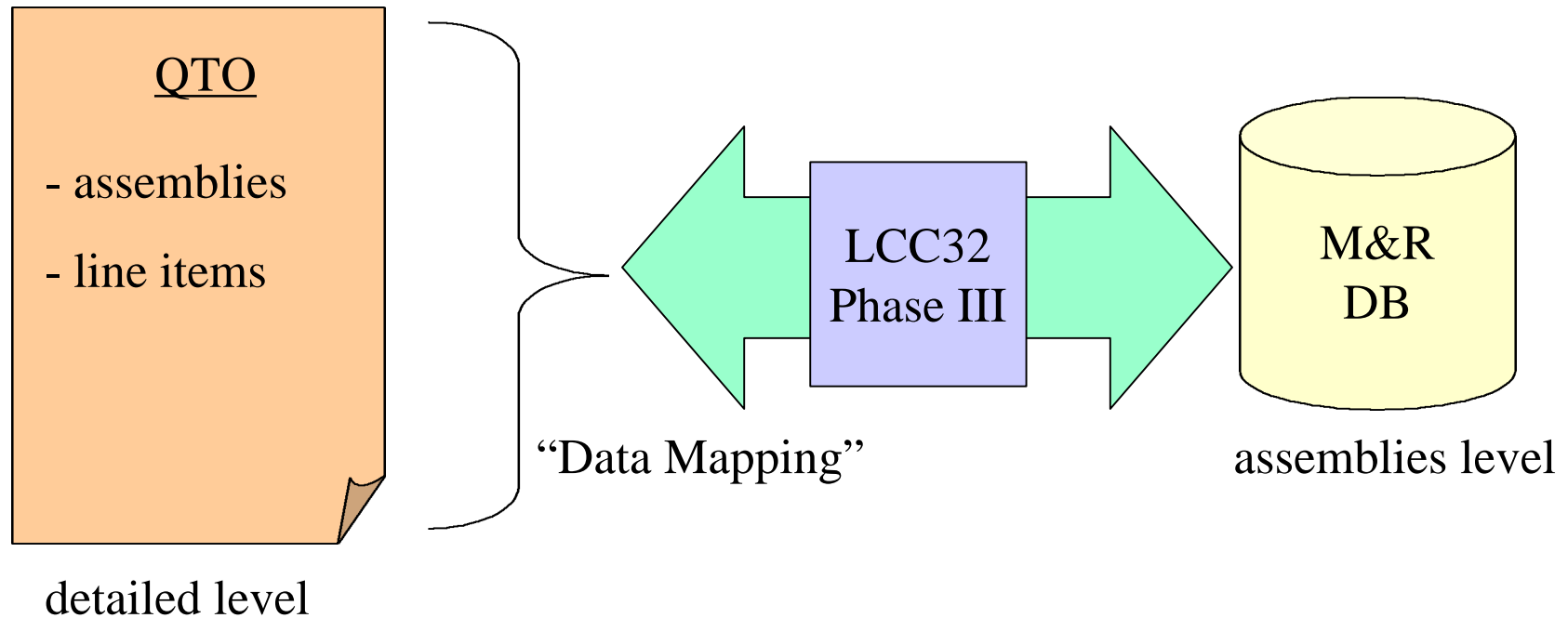
Cons:

- Re-design of LCC32 required; significant work involved
- Must be able to effectively "match up" assemblies data from parametric system with M&R DB (i.e., one estimate could contain hundreds of assemblies, naming conventions, etc.)

Phase II: Parametric Level Link

Schedule/Tasks:

- Obtain Tri-Service commitment to initiative
    - → FY99/00 funding
    - → Seek interest from Talisman and R.S. Means
    - → as soon as possible
- Re-design of LCC32
    - → should start FY99 (concurrently w/PH I)
    - → est $70-100k (also, possible CRADA)
    - → est. completion date: FY00
- M&R DB license renewal
    - → Negotiate with R.S. Means (est. $35-60k)
    - → FY00
- Re-write of TM 5-802-1, Econ Studies for MILCON Design
    - → concurrent w/Phase II; est $10-15K
- Provide training workshop
    - → have vendor provide workshop for users, est. $10-15k
    - → available after application delivered

Phase III: QTO Data Mapping

QTO

- assemblies

- line items

detailed level

LCC32
Phase III

"Data Mapping"

M&R
DB

assemblies level

- Develop "data map" link between M32, Success and M&R DB

- Ability to conduct life cycle cost analysis during the <u>design</u> phase

- An <u>entire</u> M32 or Success estimate will be mapped to the M&R data

- Process must be enhanced to allow importing of M32/Success file into
        LCC32 and mapping to M&R DB

Phase III: M32 Data Mapping

Pros:
- Generates studies in compliance with Fed and DoD guidance
- Automated link to M&R DB
- Analyzes life cycle costs for entire building designs; able to provide analysis at the pre-design and design phases
- Imports data structure from quantity takeoff system
- Universal application; truly unique

Cons:
- Process must be enhanced to allow M32 and Success export of data; significant work may be involved
- Must be able to effectively "match up" assemblies data from M32 and Success with M&R DB (i.e., one estimate could contain unique assemblies and line items, naming conventions, etc.)
- M32 and Success assemblies may not exist; must create "mapping scheme"

Phase III: M32 Data Mapping

Schedule/Tasks:

- Obtain Tri-Service commitment to initiative
    - → Must determine if feasible and worthwhile
    - → Seek interest from BSD and R.S. Means
    - → begin FY99/00
- Enhancement of LCC32
    - → should start FY99, early FY00)
    - → est $70-100k (also, possible CRADA)
    - → est. completion date: FY00/01
- M&R DB license renewal
    - → Negotiate with R.S. Means (est. $35-60k)
    - → FY00/01
- Provide training workshop
    - → have vendor provide workshop for users
    - → est. $10-15k
    - → available after application delivered

Recommendation

- Contact Air Force and Navy ASAP to form a life cycle cost group to guide the development process

- Conduct initial meeting to discuss feasibility, expectations and concerns

- Discuss options and implications of the development approach